

REMARKS

Please reconsider the application in view of the above claim amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application and for indicating that claims 11-16, 18-25, and 31 contain allowable subject matter.

Disposition of Claims

Claims 1-34 are pending in this application. Claims 1 and 32 are independent. The remaining claims depend, directly or indirectly, from claims 1 and 32.

Amendments to the Claims

Claims 1 and 32 are amended to clarify aspects of the invention. Dependent claims 13, 17-19, and 21-24 are amended for purposes of consistency with amended independent claim 1. No new matter is added by way of these amendments as support is found at least in the originally filed claims.

Rejection(s) under 35 U.S.C. § 102

Claims 1-3 and 32 are rejected under 35 U.S.C. § 102(a) as being anticipated by US Patent No. 6,157,748 (“Taleblou”). This rejection is respectfully traversed.

“A claim is anticipated only if *each and every element* as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (emphasis added). Further, “[t]he identical invention must be shown in as complete detail as is contained in the claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). Furthermore, *each limitation* of every

claim must be given weight in determining patentability. *See In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970) (“*All words* in a claim must be considered in judging the patentability of that claim against the prior art.” (emphasis added)); MPEP § 2106 (“USPTO personnel should begin claim analysis by identifying and evaluating *each* claim limitation.” (emphasis added)). Broad generalizations of the claim limitations are insufficient to support an anticipation or obviousness rejection. MPEP § 2141.02 (“Distilling an invention down to the ‘gist’ or ‘thrust’ of an invention disregards the requirement of analyzing the subject matter ‘as a whole.’”).

Independent claim 1 is amended to recite some of the limitations of original dependent claims 13 and 17. Independent claim 32 is amended to recite similar subject matter and is substantially similar to amended claim 1. Specifically, the claimed invention requires, in part, (i) calculating a flux for each zone on the acquired image, (ii) calculating a flux for each of a plurality of zones on a set of reference images comprising a parasite background image and an adjustment image, and (iii) calibrating the fluxes of the acquired image using the fluxes of the set of reference images. That is, each individual fibre core is processed by performing the steps detailed in (i) – (iii). Applicants respectfully assert that Taleblou fails to disclose or render obvious the limitations of the amended independent claims.

Taleblou is directed to processing endoscopic images obtained with multifibers. An endoscopic image in Taleblou is processed with respect to intensity values for each pixel obtained by interpolating intensities of three cores, forming a triangle of cores. *See* Taleblou, col. 18, ll. 39-46. However, Taleblou is completely silent with respect to the limitations required by (i) – (iii) above. Specifically, Taleblou fails to disclose using several reference images to perform image reconstruction, as required by the amended claims. By using both a background and an adjustment

image (bright reference image), the claimed invention allows for the compensation of an affine distortion ($ax+b$) on the fibre fluxes. In contrast, Taleblou discloses the use of only one image and can thus only compensate for a linear distortion (ax). Applicant believes that the Examiner also recognizes this major distinction between the claimed invention and Taleblou, as the Examiner admits as much by recognizing that original dependent claim 13 contains allowable subject matter. *See* Office Action, page 8, Allowable Subject Matter. Accordingly, Taleblou fails to explicitly disclose processing each individual fibre core by using both a background image and an adjustment image, calculating fluxes for each zone is both the acquired image and the set of reference images, and calibrating the zones of the acquired image using the flux calculations.

In view of the above, it is clear that the Examiner's contentions fail to support an anticipation rejection of the amended independent claims. In fact, Applicant asserts that the amended independent claims are allowable over the cited prior art, as the amendments to the claims incorporate the crux of dependent claim 13, which the Examiner has already deemed to contain allowable subject matter. Dependent claims 2-3 are patentable for at least the same reasons. Accordingly, withdrawal of this rejection and favorable consideration of the amended independent claims is respectfully requested.

Rejection(s) under 35 U.S.C. § 103

MPEP § 2143 states that "[t]he key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious." The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1739, 75 U.S.L.W. 4289

(2007) noted that the analysis supporting a rejection under 35 U.S.C. § 103 should be made explicit. *See* MPEP § 2143.

In particular, the Examiner “must articulate the following: (1) a finding that the prior art included each element claimed, although not necessarily in a single prior art reference, with the only difference between the claimed invention and the prior art being the lack of actual combination of the elements in a single prior art reference; ...” MPEP § 2143(A). Applicants respectfully assert that the Examiner has failed to do so.

If the Examiner does not produce a prima facie case, Applicants are under no obligation to submit evidence of non-obviousness. The initial evaluation of prima facie obviousness thus relieves both the Examiner and Applicants from evaluating evidence beyond the prior art and the evidence in the specification as filed until the art has been shown to suggest the claimed invention. *See* MPEP § 2142.

Claims 4-5

Claims 4-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taleblou in view of NPL Document “Hybrid Image Segmentation Using Watersheds and Fast Region Merging” by Harris (“Harris”). This rejection is respectfully traversed.

As described above, Taleblou fails to disclose or render obvious the aforementioned claimed limitations required by the independent claims. Further, Haris fails to supply that which Taleblou lacks. That is, Haris fails to disclose or render obvious the limitations required by (i) – (iii) above, as Haris is silent with respect to calculating fluxes are both an acquired image and a set of reference images and then performing calibration of the acquired image using the flux calculations. Moreover, Haris also fails to provide that which the Examiner relies on Haris as disclosing.

Dependent claims 4-5 relate to a stage of detecting the fibres from a reference image that clearly occurs before the reconstructing of the acquired image. Haris aims at providing a generic image segmentation tool. In Haris, no *a priori* is used on the size of the segmented regions. In the claimed invention, and specifically as recited in claims 4-5, the deduction stage occurs beforehand, and there is an *a priori* on the size of the fiber core that is segmented. Hence, in the claimed invention, there is a definition of abnormal surfaces known beforehand and used to drive the segmentation. Accordingly, Haris fails to disclose or render obvious dependent claims 4-5.

Claims 7-10

Claims 7-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taleblou in view of Harris and further in view of US Pat. No. 4,926,257 (“Miyazaki”). This rejection is respectfully traversed.

As described above, Taleblou and Haris fail to disclose or render obvious the limitations of the independent claims as pending. Further, Miyazaki fails to supply that which Taleblou and Haris lacks, as Miyazaki also fails to disclose or render obvious the limitations required by (i) – (iii) above. Accordingly, independent claims 1 and 32 are patentable over Taleblou, Haris, and Miyazaki, whether considered separately or in combination. Dependent claims 7-10 are patentable for at least the same reasons.

Further, with respect to dependent claim 7, the Examiner appears to state that Haris discloses a morphological opening as claimed, on page 5 of the Action. This is incorrect. In fact, Haris does not even mention a morphological opening. The cited portion of Haris, *i.e.*, page 1697, section IV, paragraph 2, only mentions a morphological watershed, which is the algorithm that is used in the

Haris paper for image segmentation. The Examiner has equated two concepts as being the same merely because there is a common word “morphological” in both phrases. In actuality, the two notions only have in common their belonging to the large field of mathematical morphology. A morphological opening as claimed is the dilation of the erosion of a set A by a structuring element B, resulting in removing of small objects from the foreground of an image, placing them in the background. Again, by equating the morphological algorithm as a whole that is disclosed in Haris with the specific processing that is defined by a morphological opening as recited in claim 7, the Examiner has mischaracterized the teachings of Haris, or has read out specific claimed limitations, both of which are wholly improper.

Moreover, the Examiner relies on Miyazaki as disclosing image inversion, as recited in claim 7. However, the image inversion in Miyazaki is not related to digital image processing and does not refer to the same definition of inversion. Miyazaki refers to optical means (prisms) of image re-orientation whereas the claimed invention refers to the application of a mathematical additive inversion (a.k.a. opposite) operation. For at least these reasons, Haris and Miyazaki may not be properly construed to disclose or render obvious the limitations required by claim 7.

Turning to dependent claim 8, the Examiner relies on Miyazaki as disclosing a scalar-type anisotropic scattering stage that precedes the image inversion stage. However, there is nothing about anisotropic diffusion in Miyasaki, column 1, line 40-45, as cited by the Examiner. Rather, the cited portion merely discloses Accordingly, Miyasaki fails to teach the limitations of dependent claim 8.

With regard to claim 9, the Examiner cites Taleblou as disclosing that the prefiltering also comprises a stage during which an interpolation to the nearest neighbour is carried out in order to

double the size of the image vertically and horizontally. However, the interpolation in Taleblou, column 8, lines 52-60 refers to an image reconstruction stage and is thus **not** a *prefiltering stage*. This is evidenced by the fact that the input for the interpolation in Taleblou is a scattered point set. In contrast, the interpolation used to double the image size in the claimed invention is applied on the raw image, which is what makes it part of the prefiltering stage, as claimed. Accordingly, Taleblou fails to disclose or render obvious the limitations required by claim 9.

With respect to dependent claim 10, the Examiner relies on Haris as disclosing a temporal (time-based) prefiltering stage for a plurality of acquisition images, and cites the Abstract of the Haris paper. There is absolutely no mention of any type of *time-based filtering* process in the Abstract of Haris.

In view of the above, none of Taleblou, Haris, and Miyasaki disclose or render obvious the additional limitations required by dependent claim 7-10. Accordingly, it is clear that dependent claims 7-10 are separately patentable over all of the cited art for at least the reasons described above. Withdrawal of this rejection is respectfully requested.

Claims 17, 26-30, and 34

Claims 17¹, 26-30 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taleblou in view of US Pat. No. 5,764,809 ("Nomami").

As described above, Taleblou fails to disclose or render obvious the limitations required by the independent claims of the present application. Further, Nomami fails to supply that which Taleblou lacks. Specifically, Nomami relates to image processing by finding and matching correlating points in images. However, Nomami does not disclose or render obvious calculation of fluxes on both the acquired image and a set of reference images and then performing calibration of the acquired image using the flux calculations, as required by (i) – (iii) above.

In view of the above, it is clear that the independent claims are patentable over Taleblou and Nomami, whether considered together or alone. Dependent claims 17, 26-30, and 34 are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 33

Applicants note that claim 33 is omitted from the Examiner's rejections. Claim 33 is also not listed as one of the claims deemed to contain allowable subject matter on page 8 of the Action mailed June 1, 2010. Accordingly, Applicants argue for the separate patentability of dependent claim 33 as follows.

Claim 33 specifically recites "means for modifying the sampling rate, the quality of injection into the optical fibres, and the setting of a detection chain in order to guarantee an "egg box"

¹ Claim 17, although omitted from the subheading of the rejection on page 6, paragraph 8 of the Office Action, is included in the Examiner's remarks under this set of rejections. Accordingly, Applicant traverses the rejection as including claim 17.

profile.” In other words, claim 33 recites a "feedback loop" between the reconstruction algorithm and the imaging parameters, involving the modification of all three parameters recited in the claim. None of the cited prior art discloses or renders obvious tuning the acquisition by modifying imaging parameters in order to ease the reconstruction of the acquired image. Accordingly, Applicant asserts that claim 33 is separately patentable over the cited prior art and should be deemed as containing allowable subject matter.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 17452/005001).

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Respectfully submitted,

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